

Serial No.: 09/869,981
Reply to Office Action of: August 5, 2003
Atty. Docket No.: GJH-0002

AMENDMENTS TO THE SPECIFICATION

In the substitute specification, please replace the following paragraphs as indicated:

At page 6, paragraph number (0018):

--Figure 1 is the X-ray diffraction pattern of a $\text{Ni-Mo}_{0.5}\text{W}_{0.5}\text{O} \cdot \text{NH}_4$ - $\text{Ni}_{1.5}\text{Mo}_{0.5}\text{W}_{0.5}$ compound prepared by boiling precipitation before calcining (Curve A) and after calcining at 400°C (Curve B). Note that the patterns for both the precursor and the decomposition product of the precursor are quite similar with the two peaks at essentially the same place. The ordinate is relative intensity; the abscissa is two theta (degrees).--

At page 6, paragraph number (0019):

--Figure 2 shows the X-ray diffraction patterns, by $\text{CuK}\alpha$ radiation ($\lambda=1.5405\text{\AA}$), of $\text{Ni-Mo}_{1-x}\text{W}_x\text{O} \cdot \text{NH}_4$ - $\text{Ni-Mo}_{1-x}\text{W}_x$ precursors wherein curve A is $\text{Mo}_{0.9}\text{W}_{0.1}$, curve B is $\text{Mo}_{0.7}\text{W}_{0.3}$, curve C is $\text{Mo}_{0.5}\text{W}_{0.5}$, curve D is $\text{Mo}_{0.3}\text{W}_{0.7}$, curve E is $\text{Mo}_{0.1}\text{W}_{0.9}$, and curve F is Mo_0W_1 . The ordinate and abscissa are as described for Figure 1.--

At page 9, paragraph number (0024):

--The feedstock to the first hydrodesulfurization stage will typically contain greater than about 3,000 wppm sulfur. The product stream from the first stage hydrodesulfurization will typically have a sulfur content of about 300 to about 1,500 wppm, preferably from about 300 to 1,000 wppm, and more preferably from about 300 to 750 wppm. The product stream from the second stage hydrodesulfurization will have a sulfur content less than about 150 wppm, preferably less than about 100 wppm, and more preferably less than about 50

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wppm. As previously mentioned, one or more of the reaction zones in one or both of the hydrodesulfurization stages will contain the bulk multimetallic catalyst of the invention. The second hydrodesulfurization stage must contain, in at least one reaction zone, a bed of the bulk multimetallic catalyst of the present invention. The first hydrodesulfurization stage may or may not contain a bed of the bulk catalyst of this invention. The first hydrodesulfurization stage can contain only conventional hydrodesulfurization catalyst or it can contain one reaction zone with conventional hydrodesulfurization catalyst and at least one reaction zone that contains the bulk multimetallic catalyst of the present invention. For example, one or both of the reactors of the reaction stages can contain two or more reaction zones, each reaction zone containing catalyst. The first reaction stage can contain a bed of conventional hydrodesulfurization catalyst in one reaction zone and a bed of the bulk multimetallic catalyst of this invention in another reaction zone. Preferably the first reaction zone will contain the conventional hydrodesulfurization catalyst. The second hydrodesulfurization stage in addition to the bulk multimetallic catalyst of the present invention can contain a bed of ~~acid functionalized~~ isom-enhanced bulk multimetallic catalyst. It is also within the scope of this invention that the bulk multimetallic catalyst of this invention can be used in all reaction zones of both reaction stages.--

At page 29, paragraph number (0079):

--The high activity bulk multimetallic HDN/HDS and ~~acid-functionalized~~ isom-enhanced HDS catalysts of the present invention could be optimized for use in a countercurrent flow reactor. A countercurrent flow reactor offers several advantages over co-current reactors including: high hydrogen partial pressures; internal stripping of H₂S and NH₃ and high reactor temperature. One non-limiting process option employing countercurrent flow technology is to feed to raw feedstock in a first hydrodesulfurization stage which is operated in co-current

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mode to produce a product which is lower in sulfur and nitrogen than the original feed. The hydrotreated oil is then flashed to separate light gases, especially ammonia, from the liquid product. If necessary, the hydrocarbon portion of this interstage vapor stream can be hydrotreated in a dedicated "vapor-phase" reactor or condensed and reintroduced into the first-stage reactor to reduce sulfur to acceptable levels. The hydrotreated feed is then processed over an ~~acid~~ functionalized isom-enhanced HDS catalyst in a countercurrent reactor. Liquid feed is introduced at the top of the reactor while fresh hydrogen is added at the bottom. Product ammonia and hydrogen sulfide are stripped by treat gas and exit the top of the reactor. Some of the liquid feed will vaporize and pass overhead. This vapor stream can be hydrotreated in a "vapor phase" bed above the feed injection point in the countercurrent flow reactor or condensed and reintroduced into the first-stage reactor to reduce sulfur to acceptable levels.--

In the substitute specification, at page 7, please cancel paragraph number (0020) in its entirety:

~~--The invention is based in part on the discovery that molybdenum in a Ni-Mo phase may be partially substituted by tungsten. The resulting phase is an essentially ammonia-free, substantially amorphous, oxide phase which upon sulfidation provides enhanced catalytic activity relative to the unsubstituted Ni-Mo phase. The invention is also based in part on the discovery of catalysts containing at least one Group VIII non-noble metal and at least two Group VIB metals, wherein the ratio of Group VIB metal to Group VIII non-noble metal is from about 10:1 to about 1:10.--~~